

REMARKS/ARGUMENTS

The claims are 20-28. Claim 20 has been amended to better define the invention and claim 21 has been amended in view of the amendment to claim 20. In addition, these claims and claims 23 and 24 have been amended to improve their form. The specification has been amended to provide headings and to include a Brief Description of the Drawings section as requested by the Examiner. Support for the claims may be found, *inter alia*, in the disclosure in the paragraph bridging pages 4-5, the paragraph bridging pages 5-6 and the paragraph bridging pages 8-9. Reconsideration is expressly requested.

Applicants would like to thank that Examiner for the courtesy of a telephone interview on July 22, 2008, the substance of which is set forth herein. The Office Action indicated that the Information Disclosure Statement had not been fully considered because foreign references were not available, even though the Notice of References Cited attached to the Office Action indicated that the Examiner had in fact considered the foreign references which Applicants submitted with their June 15,

2007 Supplemental Information Disclosure Statement. In the July 22, 2008 telephone interview, the Examiner confirmed that he had in fact considered the foreign references which were submitted with the June 15, 2007 Supplemental Information Disclosure Statement and that the statement on page 2 of the Office Action to the contrary was in error.

The specification was objected to as lacking a Brief Description of the Drawings section and claim 24 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite in the use of the phrase "more specifically" and "or the like." In response, Applicants have amended the specification and claim 24 to correct these informalities, which it is respectfully submitted overcomes the Examiner's rejections on these bases.

Claims 20-22 were rejected under 35 U.S.C. 102(b) as being anticipated by *U.S. Patent No. 2,963,853 to Westcott, Jr.* Claims 20-22, 24 and 26-28 were rejected under 35 U.S.C. 102(b) as being anticipated by *U.S. Patent No. 5,927,080 to Lee.* The remaining claims 23 and 25 were rejected under 35 U.S.C. 103(a) as being

unpatentable over *Lee*.

Essentially the Examiner's position was that each of *Westcott, Jr.* and *Lee* discloses the power amplifier recited in the claims, except for the specific frequency and the force balancer at the connection, which were said to be within the skill of the art.

In response, Applicants have amended claim 21 to better define the invention and respectfully traverse the Examiner's rejection for the following reasons.

As set forth in claim 20 as amended, Applicants' invention provides a thermo-hydrodynamic force amplifier in which a liquid is displaced between a hot region and a cold region within a rigid cylinder by means of a drive-actuated displacer piston through conduits of a heater-regenerator-cooler arrangement or of a heater-recuperator-cooler arrangement so that the liquid cyclically contracts and expands, thereby providing output work

which in each cycle is greater than an input work at the displacer piston. The liquid in the arrangement is cyclically displaced in alternating flow directions in a circuit, which includes in its circuit path the arrangement and the displacer piston in the rigid cylinder, the liquid producing the output work at a separate machine.

Claim 20 as amended emphasizes that there is a "circuit" which is synonymous with a "physical loop" in contrast to a "cycle" which is a "logical loop." Thus, there is a "circuit path," i.e. the path along the circuit in the machine as discussed in the paragraph bridging pages 8-9 of Applicants' disclosure. The "path" is discussed in the paragraph bridging pages 5-6 of Applicants' disclosure which indicates that the path is formed by the displacer piston on the one hand, and from the "arrangement" on the other hand.

None of the cited references discloses or suggests a thermohydrodynamic force amplifier having the structure recited in claim 20 as amended. *Westcott, Jr.* does not produce the output

work at a separate machine as recited in claim 20 as amended. Rather, the output work drives the crankshaft 33 as described in column 6, lines 44ff of *Westcott, Jr.* which is still the same machine because the torque of the crankshaft 33 is needed to actuate the piston 21 in return. *Westcott, Jr.* is thus a typical representative of the state of the art discovered by Malone and discussed in Applicants' disclosure at page 1 to the first full paragraph of page 3.

Westcott, Jr. couples the piston in a mechanical way with the crankshaft to which the work is delivered. A part of the work is then absorbed into the piston again. With Applicants' thermo-hydrodynamic force amplifier as recited in claim 20 as amended, the output work is produced under pressure while the fluid expands; however, in this phase, the whole work given to the "separate machine" does in fact remain at the separate machine. The system does not need any work generated in the expansion phase to fulfill the cycle. Rather, it can fulfill the cycle without any pressure, simply by further driving the displacer piston 11.

Lee fails to disclose or suggest a drive-actuated displacer piston in the circuit path as recited in Applicants' claim 20 as amended. In Lee the drive 24 actuates a different piston, namely the "piston 23;" however, this piston 23 is located outside the "circuit path." The circuit path in Lee includes only the "displacer piston 22" which itself is not actuated by the drive 24.

Lee discloses a machine in which a first piston 23 is driven. Then, there is a circuit in the path of which there is a different piston, namely displacer piston 22. The coupling between the linear drive motor 24 and the displacer piston 22 is therefore possible only over the fluid. In detail, the coupling is reached via positive and negative pressure of the fluid in the compression chamber 26. This arrangement, however, is the typical arrangement of any stirling machine. The fluid system must never be open. Otherwise, the coupling fails.

In contrast, Applicants' thermo-hydrodynamic force amplifier as recited in claim 20 as amended goes in a different way. With

Applicants' thermo-hydrodynamic force amplifier as recited in claim 20 as amended, the displacer piston 11 which is in the path of a fluid circuit is directly actuated. Therefore, the fluid directly follows the linear drive in its cyclic movement back and forth in the circuit. Because there is a no need for a fluid coupling between two pistons, there is no need for the fluid system to always have a closed system. Rather, the forces are allowed to decouple.

In addition, *Lee* fails to disclose or suggest even the idea to produce the work at a "separate machine" as recited in Applicants' claim 20 as amended. *Lee* couples the central fluid circuit (FIG. 2: expansion chamber 25, displacer piston 22, compression chamber 26, first pipe 71, heat exchanger 30, second pipe 72) to the two outer circuits in a mechanical, bidirectional manner, i.e. via the "vibration-absorbing-and-pumping means 10C, 10F." Thus, *Lee* lets the work produced by the central fluid circuit come back in part.

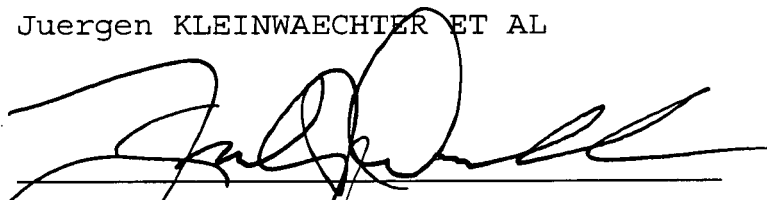
In contrast to both *Lee* and *Westcott, Jr.*, Applicants'

thermo-hydrodynamic force amplifier as recited in claim 20 as amended deliberately spaces out the thermodynamic processes known and necessary from conventional machines between the driven piston and a separate displacer piston. Although at first sight, the thermo-hydrodynamic force amplifier as recited in claim 20 as amended thwarts the basic principles of a thermo-hydrodynamic force amplifier, what is gained is a much higher efficiency than in *Lee* or *Westcott, Jr.*, and at the same time, the mechanical stress induced on the machine is very low.

Accordingly, it is respectfully submitted that neither *Lee* nor *Westcott, Jr.* anticipates or renders obvious Applicants' claim 20 as amended or claims 21-28 which depend directly or indirectly thereon.

In summary, claims 20-21 and 23-24 have been amended along with the specification. In view of the foregoing it is respectfully requested that the claims be allowed and that this application be passed to issue.

Respectfully submitted,
Juergen KLEINWAECHTER ET AL

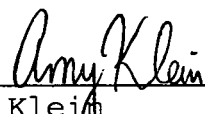


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